



## Anopheles Mosquito Species in Betung Bedarah, Tebo Regency, Jambi Province

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### Abstract

**Background:** Indonesia is a tropical country which is a good breeding ground for mosquitoes. Mosquitoes are still one of arthropods that contribute to occurrence of infectious diseases, including malaria, which is a disease that is a health problem in Jambi Province.

**Objective:** To determine types of Anopheles mosquito species in Betung Bedarah Tebo, Jambi.

**Methods:** A descriptive study to identify distribution of mosquitoes in Betung Bedarah, Tebo Regency used human landing collection and resting collection methods. Collection of mosquito samples used an aspirator and light trap. Analysis used tabulation.

**Results:** Of the 64 mosquitoes collected, 25% were Anopheles mosquitoes which consisted of 43.7% *Anopheles barbirostris*, 25% *Anopheles vagus*, 18.7% *Anopheles aconitus*, and 12.6% *Anopheles kochi*.

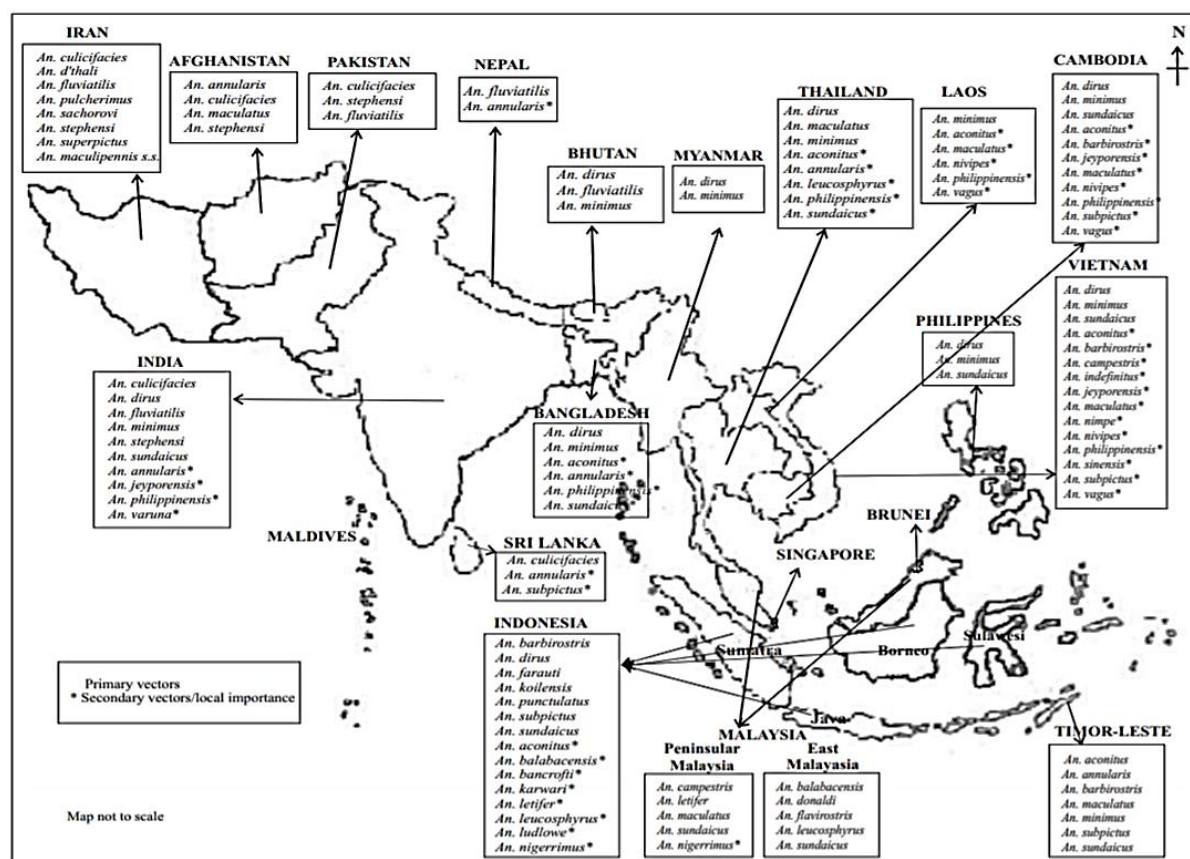
**Conclusion:** Most of mosquito species collected at Betung Bedarah Tebo were *Anopheles barbirostris*.

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## INTRODUCTION

Malaria is still one of health problems in Indonesia and Indonesia is a malaria holoendemic because malaria is found throughout the year. Malaria is a disease caused by *Plasmodium* parasite and transmitted through of Anopheles mosquito bite.<sup>1</sup> Of the 424 Anopheles mosquitoes that have been

identified morphologically, there are 70 species which are the main vectors of malaria in the world. Prevalent distribution of Anopheles mosquitoes in South Asia can be seen in Figure 1. There are 15 species of Anophels that contribute to malaria in Indonesia.<sup>2</sup> Dominant Anopheles species found in Sumatra island include *Anopheles sundaicus*, *Anopheles maculatus*, *Anopheles aconitus*.<sup>1</sup>



**Figure 1:** Malaria vectors prevalent in South Asia, South-East Asia and neighbouring countries<sup>2</sup>

Malaria is one of priority health problems for infectious diseases in Jambi Province, Sumatra island. Tebo Regency is one of regions in Jambi Province, with a malaria morbidity rate (Annual Parasite Incidence/ API) of 0.172 per 1000 population and ranks second as the district with highest malaria disease.<sup>3</sup> Previous research stated that Anopheles was largest mosquito distribution that contributed to human disease in the Betung Bedarah, Tebo Regency (25.00%), followed by Culex (17.19%), and Mansonia (14.06%), and the

other was Armigeres (43.75%). Armigeres dominates mosquito found in that study.<sup>4</sup> There are several species found in Jambi Province area including *Anopheles nigerrimus*,<sup>5-8</sup> *Anopheles umbrosus*,<sup>5,6</sup> *Anopheles subalbatus*,<sup>5</sup> *Anopheles barbirostris*, *Anopheles vagus*, *Anopheles aconitus*, *Anopheles kochi*, *Anopheles umbrosus*.<sup>6</sup> *Anopheles barbumbrosus*, *Anopheles letifer*, *Anopheles separatus*, *Anopheles sinensis*.<sup>5-8</sup> *Anopheles tessellatus*, dan *Anopheles annularis*.<sup>8</sup> Several studies that have been conducted in Jambi Province have shown varying

results regarding Anophles mosquito species, therefore researchers wanted to know distribution

## METHODS

This field survey activity was carried out as an effort to identify Anopheles mosquito species in Betung Bedarah, Tebo Regency. Human landing collection method (catching mosquitoes by baiting people) at night 20.00-24.00 WIB and resting collection (catching mosquitoes directly while perching or resting) were methods used in sampling. Sampling was carried out randomly on 10-11 December 2017 in the Betung Bedarah

of Anopheles mosquito species in Betung Bedarah, Tebo Regency, Jambi Province.

area, Jambi. Collection method used an aspirator (Figure 2) device and a light trap uses a light (light trap) and then is inserted into bufferglass.<sup>9</sup> Volunteer samples are used as bait during fishing.

Identification of Anopheles mosquito species using light microscope, magnification 10 and 40 objective lens, and confirmed according to Anopheles identification manual book<sup>9-11</sup> by vector, disease control and eradication (pengendalian dan pemberantasan penyakit / P2P) officers.



Figure 2. Aspirator<sup>6</sup>

## RESULTS

Table 1. Types of mosquitoes in Betung Bedarah, Tebo Regency

Types of mosquitoes	Method of collection		N (%)
	HLC n(%)	RC n(%)	
Anophles	12 (18.7)	4 (6.3)	16 (25,0)
Non Anopheles	31 (48.4)	17 (26.6)	48 (75.0)
Total	43 (67.1)	21 (32.9)	64 (100.0)

HLC= human landing collection, RC= resting collection

Table 2. Anopheles mosquito species in Betung Bedarah, Tebo Regency

Anopheles species	Method of collection		N (%)
	HLC n(%)	RC n(%)	
<i>Anopheles barbirostris</i>	5 (41,6)	2 (50)	7 (43,7)
<i>Anopheles vagus</i>	3 (25)	1 (25)	4 (25,0)
<i>Anopheles aconitus</i>	2 (16,7)	1 (25)	3 (18,7)
<i>Anopheles kochi</i>	2 (16,7)	0 (0)	2 (12,6)
Total	12 (75)	4 (25)	16 (100)

HLC= human landing collection, RC= resting collection

From table 1, of the 64 mosquitoes collected, 25% were *Anopheles* (16 mosquitoes) and 75% non *Anopheles* (48 mosquitoes) included *Armigeres*, *Culex*, and *Mansonia*. Most of mosquito species collected using human landing collection (HLC) method were 43 mosquitoes (67.1%). Species analysis was only performed on *Anopheles* mosquitoes as a vector of malaria. Of the 16 *Anopheles* mosquitoes collected, 4 species were obtained consisting of 7 mosquitoes *Anopheles barbirostris* (43.7%), 4 mosquitoes *Anopheles vagus* (25%), 3 mosquitoes *Anopheles aconitus* (18.7%), and 2 mosquitoes *Anopheles kochi* (12.6%) (table 2).

## DISCUSSION

From collection, a quarter of mosquitoes are *Anopheles* with species consisting of *Anopheles barbirostris*, *Anopheles vagus*, *Anopheles aconitus*, *Anopheles kochi*. *Anopheles barbirostris* and *Anopheles aconitus* were 2 of 15 *Anopheles* species that contributed to malaria in Sumatra.<sup>2</sup> The largest *Anopheles* mosquito species found was *Anopheles barbirostris*. This result is similar to previous research in Teluk Kecimbung, Sarolangun Regency.<sup>6</sup> Several studies in Jambi Province had different results, in Nipah Panjang II Village, Tanjung Jabung Timur Regency was dominated by *Anopheles letifer* (40%),<sup>8</sup> in Muaro Jambi District was *Anopheles Barumbrosus*,<sup>5</sup> in Teluk Rumpang Village, Sarolangun Regency,<sup>8</sup> and Nibung Putih Village, Muara Sabak Barat Subdistrict, Tanjung Jabung Timur Regency<sup>7</sup> dominated by *Anopheles nigerimus*. Different results in other provinces such as in Lengkiti District, OKU, South Sumatra, showed that *Anopheles* mosquito species was dominated by *Anopheles philippinensis*,<sup>12</sup> in Aceh Besar District dominated by *Anopheles vagus*,<sup>10</sup> in South Lampung and Pesawaran Districts<sup>13</sup> and Kenagarian Sungai Pinang Kecamatan Koto, West Sumatra<sup>14</sup> dominated by *Anopheles sundaius*. The difference *Anopheles* species population

results may be due to differences in geographical description of each observation area.

Many *Anopheles* species prefer shade to support their breeding place.<sup>1</sup> *Anopheles* breeding places include: rice fields, hills/ forests, and beaches/ rivers, ponds as well as kobakan/ place a puddle,<sup>8,14</sup> lagoons, swamps, ponds.<sup>14</sup> Environmental factors needed by larvae to support reproduction include pH and water vegetation as a source of survival. Breeding sites for *Anopheles* mosquitoes have a mean pH of 7.8 or breeding can be found in alkaline waters. Water vegetation is used by larvae to protect from sunlight, predators, and water surface movement. Water vegetation also makes it easier for *Anopheles* larvae to get food.<sup>10</sup> Humidity and rainfall have a significant effect on mosquito density, the higher humidity and rainfall, the higher mosquito density.<sup>13</sup>

Collected species of mosquitoes, is a category of mosquitoes that suck blood outside home (*Anopheles barbirostris*, *Anopheles vagus*, *Anopheles kochi*). Most of *Anopheles vagus* is zoophilic, exophagic and exophilic. Blood sucking activity *Anopheles vagus* on inside home occurs from 19.00 p.m. to 03.00 a.m., while peak activity outside home occurs at 18.00-19.00 p.m., in *Anopheles barbirostris* only happens outside home at 9.00-22.00 p.m., and *Anopheles kochi* at 18.00-19.00 and 22.00-23.00 p.m.<sup>12</sup>

*Anopheles* mosquito can be identified by the same length of palpus as proboscis (in females) and the shape of the palpus is like a golf club (in males), black and white scaly patches on wings, perch angle of 50°-90° to surface.<sup>19</sup> Identification key of *Anopheles barbirostris* includes on ribs and vein 1 there are 3 or less pale spots, palpi with pale rings, VII segment abdominal sternite with a brush consisting of dark scales, in middle of sternites from abdomen there are a collection of



scales -white disk and there are usually two white stripes on sides consisting of white scales.<sup>10</sup>

## CONCLUSION

Most of mosquito species collected at Betung Berdarah Tebo were *Anopheles barbirostris*. It is necessary to conduct geographic location analysis to describe breeding place of each species.

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